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Proteocephalus sophiae n. sp. (Cestoda: Proteocephalidae), a parasite of the siluroid fish *Paulicea luetkeni* (Pisces: Pimelodidae) from the Brazilian Amazon

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Proteocephalus sophiae **n. sp. (Cestoda: Proteocephalidae), a parasite of the siluroid fish** *Paulicea luetkeni* **(Pisces: Pimelodidae) from the Brazilian Amazon.-** *Proteocephalus sophiae* n. sp. is described from the siluroid fish *Paulicea luetkeni* (Steindachner), caught in the Amazon river at Itacoatiara (Amazonas State, Brazil). Among the *Proteocephalus* species of neotropical freshwater fishes, the absence of preporal vitellaria in the new species is unique with the exception of *Proteocephalus macdonaghi* (Szidat & Soria) from which it differs in a series of other characters. Including *Proteocephalus sophiae*, seven species of Proteocephalidea each representing a different genus, are recorded from *Paulicea luetkeni*, which is a surprisingly high parasite diversity.

Key-words: Cestoda - Proteocephalidae - New species - Pimelodidae - Brazil.

INTRODUCTION

Many neotropical siluroid freshwater fishes, and in particular Pimelodidae, are heavely parasitised by proteocephalidean tapeworms. Woodland (1933 a, b, c; 1934 a, b, c, d; 1935 a, b) established the base of Monticelliidae taxonomy, one of the two proteocephalidean families. This base though is shady as many of his so-called types are mixtures of several species. This was an important conclusion which was drawn from a study of recently collected material. The specimens were collected in one of Woodland's type localities in the Amazonian region and processed according to present day standards for subsequent analysis. Among this material is a sample from *Paulicea luetkeni*, locally known as "Jau", which is a new species described below.

MATERIAL AND METHODS

204 specimens of 34 fish species were collected and examined. They were dissected in the field immediately after their death. The entire split digestive tract was

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fixed with hot 4% neutral formaldehyde solution. The parasitic worms were stained with Mayer's hydrochloric carmin solution, differentiated in acid alcohol, deshydrated in ethanol, cleared in Eugenol (clove oil) and mounted in Canada balsam. Transverse sections, twelve µm thick, were stained with Weigert's haematoxylin and counterstained with eosin. The parasites are stored in the Instituto Oswaldo Cruz (IOC) and in the Muséum d'Histoire naturelle, Geneva (MHNG).

All measurements are in µm unless otherwise noted; m = mean, n = number of measurements used, CV = coefficient of variation.

Proteocephalus sophiae n. sp.

Material studied

Brazil, Amazon river at Itacoatiara (AM), in *Paulicea luetkeni* (Steindachner, 1875), (Pimelodidae), 19.9.1992, leg A. de Chambrier & A. A. Rego.

Holotype MHNG No 992.135; 4 paratypes No MHNG 992.136, 992.137, 992.138; IOC No 33.114; other material MHNG No 992/139-142; IOC No 33.115-118.

Site of infection: Anterior intestine diverticles; Prevalence: 20%, n = 5 hosts; Intensity: 12 specimens; Abundance: 2.4.

Derivatio nominis: The new species is named in honour of Sophie, the daugther of one of the authors.

Description (based on five specimens)

Worm of medium size, flattened dorsoventrally. Strobila acraspedote, 60-130 mm long, bearing about 200 proglottids. Two mm unsegmented zone posterior to scolex. Immature proglottids wider than long. Mature proglottids quadrangular or longer than wide. Gravid proglottids longer than wide. Presence of some teratologic proglottids which are not considered in the description (e.g. hypertrophy of vitellaria).

Scolex conical, 525-670 in diameter, well separated from strobila, with conspicuous prominent apical structure similar to a rostellum which does not contain a sucker, 120-165 in diameter (Figs 1,10). Four prominent lateral suckers, opening slightly anteriorly, 255-355 (m=300, n=21) in diameter. External superior part of suckers each with two small inconspicuous protuberance, clearly visible in scolex well oriented and well fixed (Figs 1,11).

Internal longitudinal musculature well developed, forming anastomosed muscular fibres bundles (Figs 5-7). Ventral osmoregulatory canals 15-30 in diameter, dorsal osmoregulatory canals, 10-15 in diameter.

83-141 (m=110, n=39, CV=14.9) spherical oval medullary testes in two fields united anteriorly, extending to the excretory canal, without overlapping it (Figs 2, 3), 12-24 (m=18, n=39) preporal testes, 19-47 (m=32, n=39) postporal testes, 45-78 (m=60, n=39) antiporal testes, 45-80 in diameter.

Piriform thinly-walled cirrus pouch, with distal part angled anteriorly, 300-410 long and 100-145 wide (Fig. 4). Cirrus pouch length to proglottid width ratio 31-41% (m=36%, n=30, CV=6.65). Invaginated cirrus elongated 235-335 x 85-100 (x=290 x 90, n=30), thick-walled with its terminal part enlarged (Fig. 4). Cirrus occupying 75-90% (x=82%, n=30, CV=4.76) of cirrus pouch length.

Genitals ducts passing between the osmoregulatory canals. Ejaculatory duct long and coiled. Vas deferens coiled, occupying a rounded field extending between

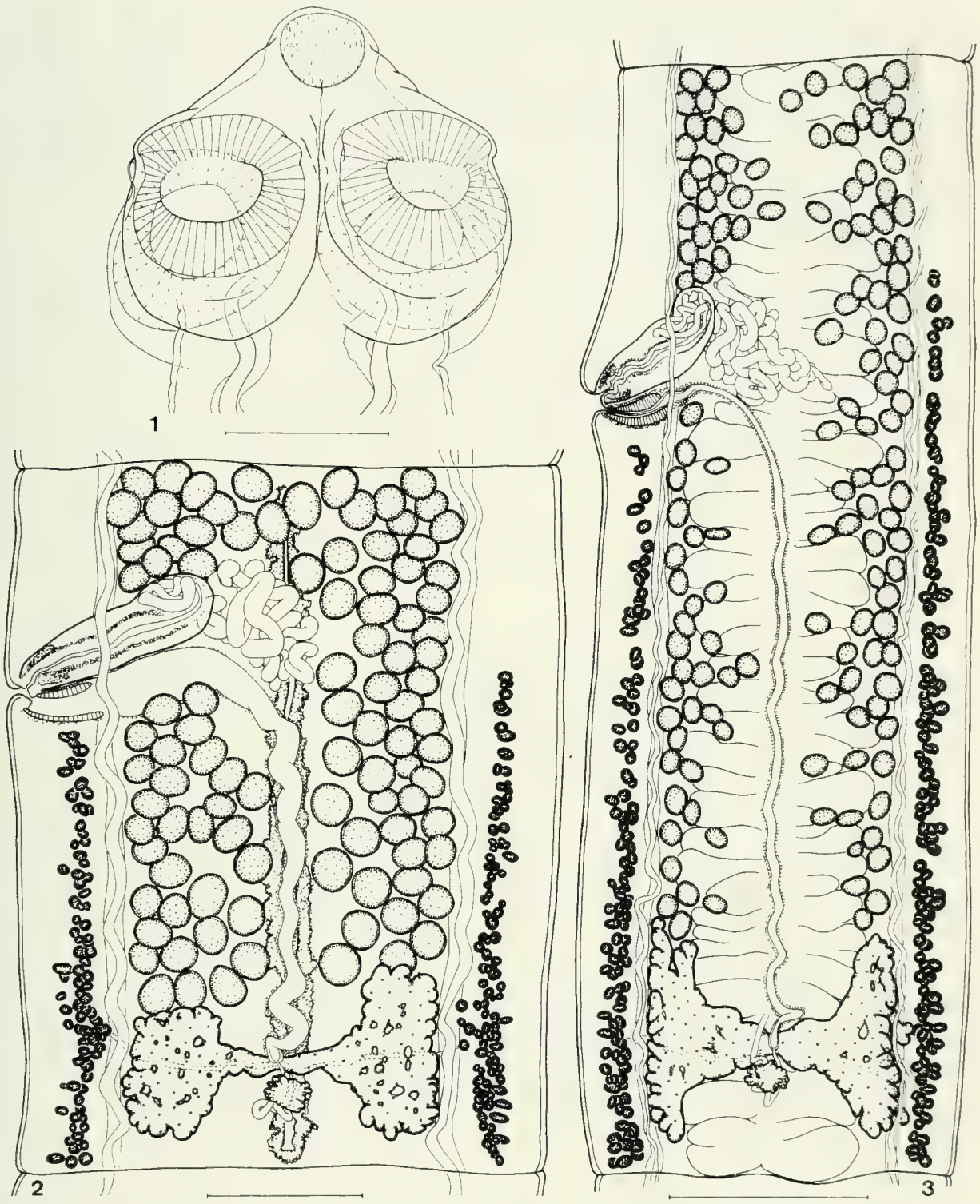


FIG. 1-3

Proteocephalus sophiae n. sp. 1. Scolex. Paratype, dorsal view, with conspicuous apical structure. 2. Mature proglottid, holotype, dorsal view, showing the posterior uterine position which overlapps the ovary and the absence of preporal vitellaria. 3. Holotype, gravid proglottid, dorsal view. The eggs are not figured. Scale: 1, 2 = 250 µm; 3 = 500 µm.

proximal part of cirrus pouch and median part of uterus, crossing over the latter in mature and gravid proglottids.

Genital atrium present. Genital pores irregularly alternate, situated anteriorly between 25% and 32% (m=28%, n=32) of proglottid length (Figs 2, 3).

Ovary medullary, biwinged, butterfly-shaped in gravid proglottids, 530-710 wide and 200-620 long. Ovary occupying 60-71% (m=66%, n=30, CV=4.33) of proglottid width (Figs 2, 3).

Vagina always posterior to cirrus pouch, with a powerful terminal vaginal sphincter (Fig. 4). Vagina and vaginal duct often dilated in mature proglottids (Fig. 2). Vaginal duct dorsal to uterus. Seminal receptacle present. Mehlis' gland 80-120 in diameter. Vitelline follicles medullar and paramuscular, i.e. situated near to the internal longitudinal musculature and extending into both the cortex and medulla (de Chambrier 1990, p. 92) (Figs 5-7). Vitellaria arranged in two lateral rows, absent from the preporal region (exceptionnally one to five preporal vitelline follicles present) and from the aporally anterior part of proglottids, with tendency to become more numerous posteriorly (Figs 2, 3). Postporal vitellaria occupying 61-69% (m=66%, n=29, CV=2.71) and aporal vitellaria occupying 69-82% (m=76%, n=29, CV=5.44) of proglottids length, respectively.

Uterus preformed, uterine stem cortical (Fig. 5). Uterine developed diverticula in medulla, invading in gravid proglottids the whole longitudinal median part of the medulla (Fig. 3). Uterus overlapping the ovary ventrally in immature proglottids and almost extending to the posterior part, occupying the entire length of gravid proglottids (Figs 2, 3). Uterus with 35-45 ramified lateral branches on each side (Fig. 3). Uterus occupying up to 75% of the gravid proglottid width. Eggs eliminated by a ventral longitudinal split along the entire length of proglottids. Eggs laying before ultimate proglottids which contains only a few eggs. Eggs with delicate external membrane, 60-70 in diameter, embryophore 20-22 in diameter, oncosphere 11-12 in diameter, hooks 5-7 long (Figs 8-9).

The new species is characterized by the following features: vitellaria absent preporally, distinctly shorter aporally than the total length of proglottid; vitellaria medullar and paramuscular; conspicuous apical structure; uterine stem cortical, uterine branches medullar; uterus occupying almost the entire length of proglottids in immature proglottids; powerful vaginal sphincter; vagina always posterior to cirrus pouch.

Discussion

The medullar position of vitellaria as well as the unarmed scolex and the form of the uniloculate suckers places the new species in the genus *Proteocephalus* Weinland 1858 (Schmidt 1986).

In this genus (as well as in the entire order of Proteocephalidea) the absence of preporal vitellaria is very scarce. Among members of *Proteocephalus* parasites in Neotropical freshwater fishes, only *P. macdonaghi* (Szidat & Nani, 1951), from *Basilichthys microlepidotus*, Argentina, shares the absence of preporal vitellaria with *P.*

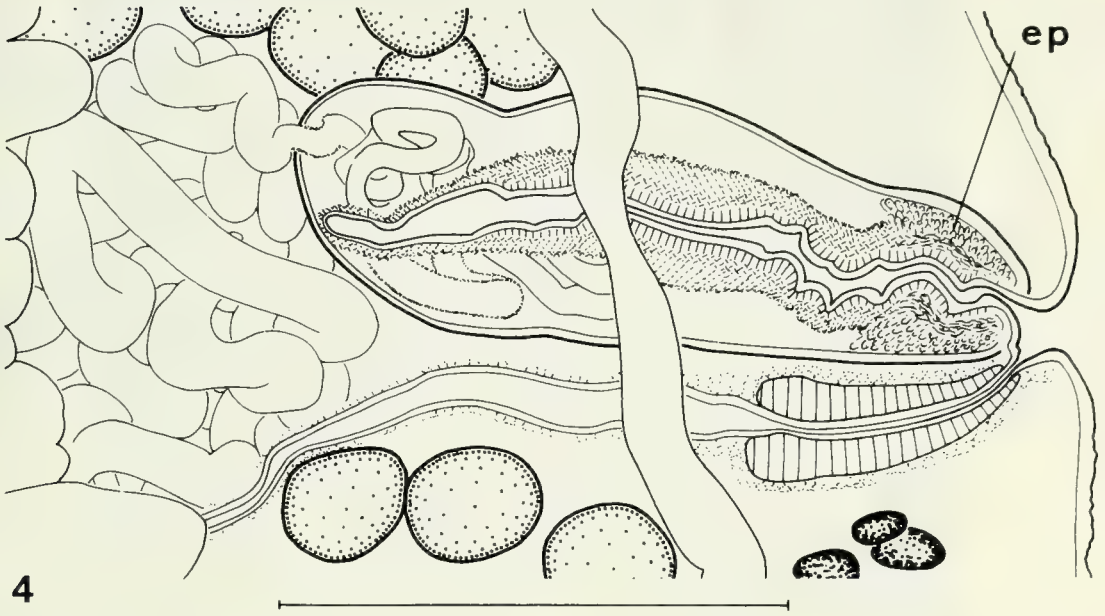


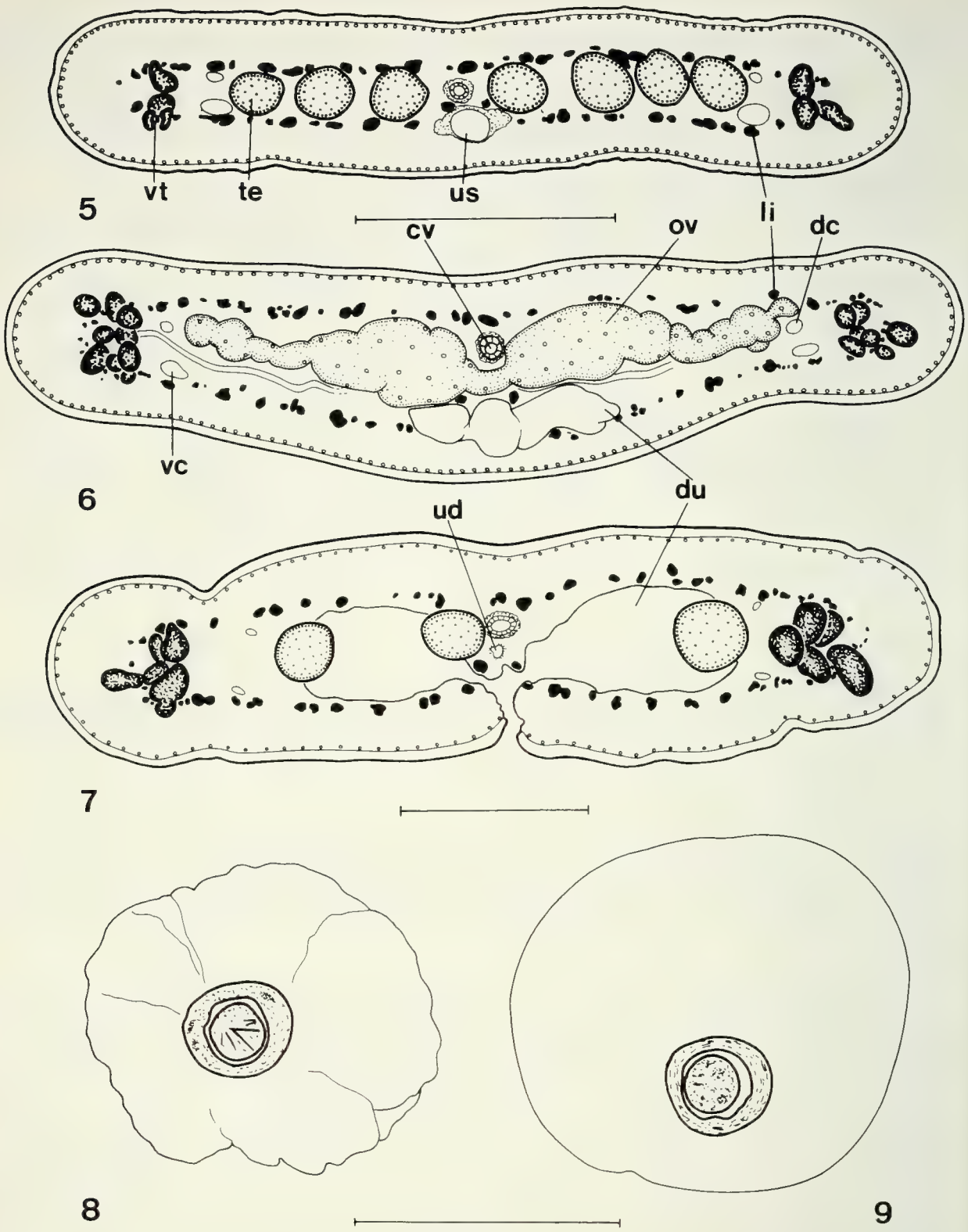
FIG. 4

Proteocephalus sophiae n. sp. Holotype, vagina and cirrus pouch, gravid proglottid, ventral view. Note the enlarged terminal part of cirrus and the conspicuous terminal vaginal sphincter; ep = enlarged terminal part of cirrus. Scale: 250 µm.

sophiae, but differs by the absence of an apical organ, shape of its eggs and the number of testes (SZIDAT & NANI 1951). Furthermore, *P. sophiae* is the only known species with an uterus which occupies almost the entire length of premature proglottids.

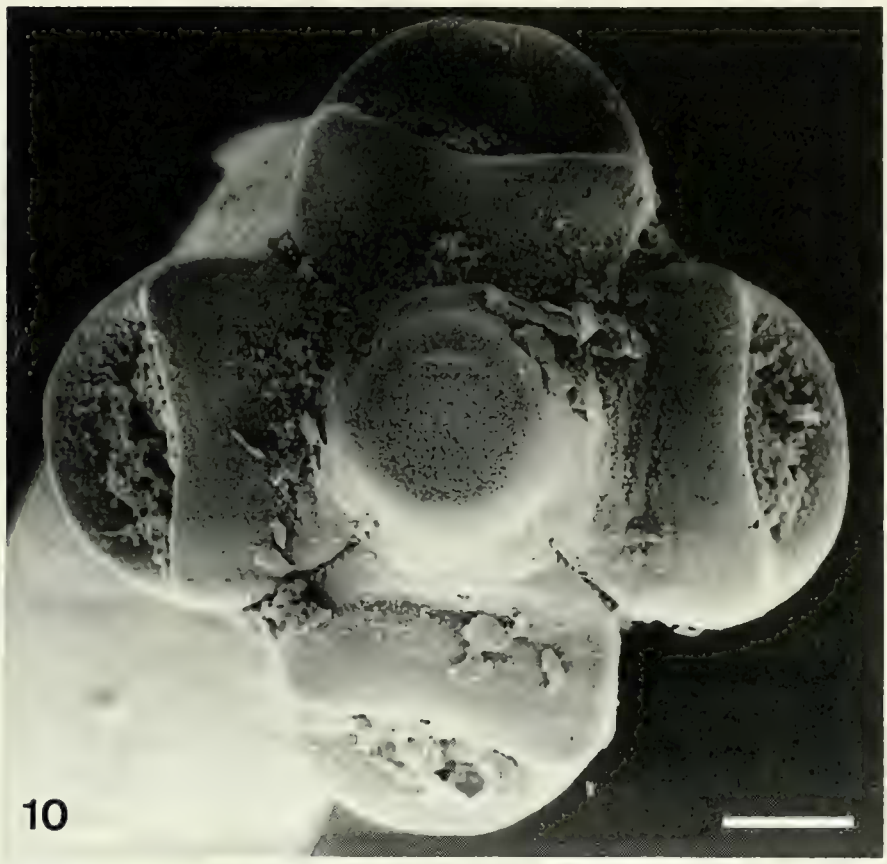
The cortical ventral position of uterine stem with development of medullar lateral branches was observed in *Proteocephalus paraguayensis* (Rudin, 1917) (see DE CHAMBRIER, 1990, fig. 4E). This character encountered for the second time may be more common than suspected by neotropical proteocephalids.

Proteocephalus sophiae n. sp. is the seventh species and genus known to parasitize *Paulicea luetkeni*. REGO & PAVANELLI (1992) listed six species from different genera in this host: *Choanoscolex abscisa* (Riggenbach, 1896); *Goezeella agostinhoi* Pavanelli & Machado dos Santos, 1992; *Jauella glandicephalus* Rego & Pavanelli, 1985; *Megathylacus brooksi* Rego & Pavanelli, 1985; *Peltidocotyle rugosa* Diesing, 1850; *Travassiella avitellina* Rego & Pavanelli, 1987. This diversity of Proteocephalidae at generic level for a single host species is comparable to that found in other siluroid hosts *Pseudoplatystoma fasciatum* and *P. coruscans* (Pimelodidae), each of which harbours six genera (see REGO & PAVANELLI, 1992). This situation confirms the impressive diversity of Proteocephalidea parasitizing Neotropical siluroid fishes. More than 75% of the recorded hosts are members of the Pimelodidae.



FIGS 5-9

Proteocephalus sophiae n. sp. Holotype. 5. Transverse section, mature proglottid. Note the cortical position of the uterine stem. 6. Transverse section at level of ovary, pregravid proglottid. 7. Transverse section, gravid proglottid with the medullar position of the uterine diverticles and the medullar-paramuscular position of vitellaria. 8, 9. Eggs; cv = vaginal canal; dc = dorsal osmoregulatory canals; du = uterine diverticle; li = internal longitudinal musculature; ov = ovary; te = testes; ud = uteroduct; us = uterine stem; vc = ventral osmoregulatory canals; vt = vitellaria; Scale: 5-7 = 250 µm; 8, 9 = 50 µm.



FIGS 10-11

Proteocephalus sophiae n. sp. Scolex. 10. Apical view. 11. Detail of one sucker, showing the upper protuberances (arrow). Scale: 10 = 100 µm; 11 = 50 µm.

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